BRITISH GUIANA. C.S.O. NO. 71/4v.

REPORT OF THE DIRECTOR OF MEDICAL SERVICES FOR THE YEAR 1941.

CONTENTS.

MEDICAL DEPARTMENT,
GEORGETOWN, DEMERARA,
September, 1942.

SIR,

I have the honour to submit, for the information of His Excellency the Governor and the Legislative Council and for transmission to the Right

Printed by the Authority of His Excellency the Governor at Georgetown, Demerara, by "The Argosy" Company, Limited, Printers to the Government of British Guiana.

No. 17,772.

Honourable the Secretary of State for the Colonies, the medical report on the health and sanitary conditions of British Guiana for the year 1941. Many maps, tables, graphs, etc., have been omitted from this report, as a war economy measure in accordance with instructions.

I have the honour to be,

Sir,

Your obedient servant,

A. H. B. PEARCE,
Director of Medical Services (Acting).

The Honourable
THE COLONIAL SECRETARY.

BRITISH GUIANA.

ANNUAL MEDICAL REPORT FOR THE YEAR ENDED 31ST DECEMBER, 1941.

I.—REVENUE AND EXPENDITURE.

1. The following is a statement of Revenue for the year 1941.

Hospitals and Dispensaries ...	... $58,572 84
Local Government Board ...	... 311 22
Visiting Fees—Port Health Officer	... 678 00
Auction duty ...	... 12
Affidavit Fees ...	... 24 50
Sale of Quinine ...	... 1 88
Sale of Official Publications ...	... 1 44
Houses (Including Colony Lands--$2)	... 2,957 24
Interest—General ...	... 3 25
Sale of Opium ...	... 338 25
Sundry Reimbursements ...	... 341 64
Miscellaneous ...	... 287 21
Malaria ...	... 3,992 25
Chemists and Druggists ...	... 508 50

2. The following is a comparative statement of Expenditure for the past three years.

1939.	1940.	1941.
$669,530.80	$799,416.09	$834,600.92

3. The percentage of actual expenditure on Medical and Public Health Services to actual revenue of the Colony was :—

1939.	1940.	1941.
10.7%	11.4%	9.8%

II.—VITAL STATISTICS.

4. The population on the 31st December, 1941, as estimated by the Registrar-General was 354,219 (males 177,147 ; females 177,072).

5. There were 12,530 births and 5,517 deaths. The natural increase of population was 7,013.

6. The number of immigrants (6,576) exceeded the number of emigrants (6,352) by 224.

7. The actual increase in the population for the year was 7,237 as compared with 5,745 in 1940.

8. *Births.*—12,530 births (6,301 males and 6,229 females) were registered. This is equivalent to a birth rate of 35.4 per 1,000 of the population as compared with 34.7 in 1940.

9. The number of still-births registered was 563 which was in proportion of 4.5 per 100 children born alive. The corresponding figure for 1940 was 4.8.

10. *Deaths.*—5,517 deaths (2,825 males ; 2,692 females) were registered, giving a crude death rate of 15.6 per 1,000 of the population as compared with 18.4 in 1940.

11. *Infant Mortality.*—The number of deaths under 1 year of age was 1,057 which equalled a rate of 84 per 1,000 registered births as compared with 104 per 1,000 in 1940. During the last three years there has been a marked decline in the crude death and the infant mortality rates. Never in the history of the Colony

has there been so low a crude death rate as 15.6 per 1,000 of the population and an infant mortality rate of 84 per 1,000 registered births. This is due no doubt to the persistent drought and also to the activities of the Health Centres and improved sanitary services.

III.—General Remarks.

12. During the year Dr. P. J. Crawford and Dr. Mark Boyd of Rockefeller Foundation visited the Colony and studied the organisation and work of the Malaria service, Dr. Mark Boyd, Malariologist, acting as consulting Malariologist. Sir Rupert Briercliffe, Medical Adviser to the Comptroller of Development and Welfare in the West Indies, spent over three weeks in the Colony, and made several recommendations regarding improvements in the service, particularly on the Health side. Many of these recommendations have now been approved by the Secretary of State and financial provision has been made under the Colonial Development and Welfare Act.

13. Dr. P. A. T. Sneath, Deputy Director of Medical Services, has been seconded for the duration of the war, and is at present stationed with the Royal Canadian Army Medical Corps in England. Dr. A. H. B. Pearce, retired Director of Medical Services, Colonial Medical Service, arrived in the Colony on the 20th January and took over the duties of Deputy Director of Medical Services.

14. The creation of American Air Bases and the arrival of American troops in the Colony have certainly stimulated Public Health activities in the neighbourhood of their territory. The closest liaison has been maintained between the American Medical Officers and the Medical Department.

15. The three voluntary Health Agencies, namely, the British Empire Leprosy Relief Association, the Infant Welfare and Maternity League and the British Guiana Society for the Prevention and Treatment of Tuberculosis, continued their valuable work normally during the year.

16. Dr. E. Muir, C.I.E , M.D., F.R.C S., Ed., Secretary of the British Empire Leprosy Relief Association, was on a visit to the Colony from the 18th to the 30th August, 1941.

17. His Excellency Sir Gordon Lethem, K.C.M.G., opened the Best Sanatorium on the 8th December, 1941. This Institution is well equipped for the treatment of cases of Pulmonary Tuberculosis, and will fill a long felt want in the Colony.

18. Rural Health Centres referred to in last year's report have all been opened and are now in active service. These centres are very popular and much appreciated by the Public. Full time Government Health Visitors have been attached to these centres and collaborate with the staff of the Infant Welfare and Maternity League.

IV.—Hygiene and Sanitation.

19. The Central Board of Health held thirteen meetings during the year. The Board dealt with 981 building applications, approved of 58 plans for the lay-out of the land for building purposes under Section 135 (1), Public Health Ordinance, 1934, and issued 78 certificates under Section 135 (4).

20. The plans mentioned above included six schemes for the improvement of housing conditions among the labourers on sugar estates. The type of building to be erected on these estates was, in the majority of instances, the new four-family dwelling in replacement of the old ten-room range. A proportion of two-family and single-family houses was also provided for. A number of these dwellings was completed during the year. Piped artesian water supply was provided wherever possible.

21. On 19th November, it was found necessary to enforce the provisions of the Public Health Ordinance, and the sanitary By-laws at Soesdyke, Demerara River, (to the north of the United States Government Air Base) where a new settlement for the accommodation of labourers employed or awaiting employment at the base, and for trade purposes, was rapidly developing without any sanitary control. A senior Sanitary Inspector was posted to this area on 24th November, and steps taken to have the land laid out for building purposes and a potable water supply provided.

22. The following regulations which were made under the relevant schemes of the Public Health Ordinance, 1934, by the Mayor and Town Council of Georgetown as the local Sanitary Authority of the Urban Sanitary District of the city of Georgetown, were approved by the Board in pursuance of Section 18 of the Ordinance on the dates mentioned :—

(i) The Keeping of Animals (Georgetown) Regulations, 1941, (approved on 29th October, 1941) ;

(ii) The Rain Water Supply Regulations, 1941 (approved on 19th November, 1941).

23. The recommendations of the Committee of the Board referred to in 1940 were complied with and a draft Bill to amend the Public Health Ordinance, 1934, was prepared and many new building regulations which it is hoped will soon be made law. It is felt certain that this new legislation will eliminate many of the building problems encountered in the past.

V.—Public Health Education.

24. The usual caravan tours were undertake n during the year under the supervision of the Health Officer, Demerara, and the County Sanitary Inspector, Demerara. Health lectures illustrated by lantern slides were given during these trips and appear to have been much appreciated. A complete course of instruction was given by the Health Department to candidates for the Royal Sanitary Institute examination for Sanitary Inspectors. The examination was held in December last year in Barbados—British Guiana sent over ten candidates.

VI.—Town and District Planning.

25. The work of survey in village areas was carried out during the year under the aegis of the Department of Lands and Mines in collaboration with the Medical Department. The Sworn Land Surveyor seconded for this work continued to prepare working plans for the laying out of lands for building purposes.

26. The construction of experimental bore-hole latrines has been continued during the year. Six more latrines were laid down in addition to the three constructed in 1940. Whilst these latrines appear to be quite successful in some places which are high lands, it would appear that their use will be rather limited in the low lying lands of the coastal belt. Experiments are still proceeding and new latrines will be constructed in places where the elevation of the land indicates a moderately low water table.

VII.—General Diseases.

27. *Nephritis.*—The total number of deaths was 485, which gave a rate of 1.4 per 1,000 in 1941 compared with 497 deaths, a rate of 1.4 per 1,000 in 1940.

28. *Respiratory Diseases.*—Pneumonia was responsible for 284 deaths throughout the Colony with a rate of 0.80 per 1,000 compared with 267 deaths, a rate of 0.77 per 1,000 in 1940.

29. *Bronchitis and Broncho-pneumonia.*—Caused 495 deaths which is equivalent to a rate of 1.4 per 1,000. During 1940 the number of deaths was 529, a rate of 1.5 per 1.000.

30. *Diseases of the Heart.*—There were 429 deaths registered in the Colony from all forms of heart disease as compared with 449 in 1940.

31. *Bowel diseases (excluding enterics and Dysenteries).*—The number of deaths registered in 1941 was 334 as compared with 387 in 1940.

32. *Cancer and other Malignant Tumours.*—The total number of deaths was 143 as compared with 127 in 1940. 184 cases of malignant disease with 34 deaths were treated in Public Hospitals.

VIII.—Communicable Diseases.

33. *Malaria.*—A long period of drought was prevalent throughout the year and the incidence of malaria was small. Dr. G. Bevier, local Representative of the Rockefeller Foundation, who is in charge of the Malaria Investigation Service, was absent from the Colony on leave from 22nd May to 30th October, 1941. During his absence his duties were performed by Dr. A. H. B. Pearce, Deputy Director of Medical Services. This service has continued to investigate the very complex malaria problem of British Guiana where the ordinary techniques involving drainage or larvicides cannot be used. It operates on a co-operative budget ($15,000 per year) to which the Government, the Sugar Producers' Association and the Rockefeller Foundation contribute equally.

34. A prolonged drought has altered considerably the nature of the studies, but it may prove to be very useful in shedding light on the biology of anophelines and particularly A. Darlingi under local conditions. This drought began in September, 1938, and during the following 33 months the amount of precipitation was considerably less than the average over the last half century. While the incidence of malaria has greatly decreased during the year, owing to the drought, it is to be expected that when the rains do come, the recurrence of anophelines can be expected with the accompanying increase of Malaria possibly reaching epidemic proportions. There were 288 deaths from Malaria as against 444 in 1940.

35. As in previous years, large quantities of quinine products were issued to Government Hospitals, dispensaries, departments, schools and mission stations. In addition large quantities of synthetic antimalarial specifics were used in the Public Hospitals.

36. *Influenza.*—31 cases were treated in Public Hospitals with 1 death. The deaths registered as due to this disease throughout the Colony were 19.

37. *Tuberculosis (all forms).*—This disease, which was made notifiable in 1912, caused 238 deaths in the Colony with a death-rate per 1,000 of 0.67 as against 242 deaths and a death-rate per 1,000 of 0.70 for 1940.

38. *Enteric Fever (including Typhoid and Para-Typhoid).*—There were 352 cases with 86 deaths as compared with 464 cases and 94 deaths in 1940.

39. *Chicken Pox.*—There were 93 cases as compared with 221 cases in 1940.

40. *Diphtheria.*—There were 34 cases with 7 deaths compared with 35 cases and 5 deaths in 1940.

41. *Puerperal Fever.*—There were 13 cases during the year with 7 deaths as against 15 cases with 11 deaths in 1940.

42. *Small Pox.*—No cases of Small Pox occurred in the Colony during the year. The usual quarantine restrictions were maintained against non-convention countries. The number of vaccinations performed during the year was 6,206 as against 7,884 in 1940.

43. *Trachoma.*—There were 3 cases as compared with 14 cases in 1940.

44. *Tetanus.*—23 cases were treated in Public Hospitals with 9 deaths, compared with 41 cases and 22 deaths in 1940.

45. *Yaws.*—14 cases were treated in Public Hospitals, the same number as in 1940. There were no deaths. 20 cases were treated in the Out-patient Departments as against 22 in 1940.

46. *Ankylostomiasis.*—310 cases were treated in Public Hospitals with 2 deaths compared with 276 and 8 deaths in 1940. The deaths registered as due to this disease throughout the Colony were 7 as compared with 11 in 1940.

47. *Yellow Fever.*—No cases of Yellow Fever have been known to occur in the Colony during the year, although protection tests have shown that it doubtless has existed recently in the interior of the Colony. A very few isolated cases of the jungle variety occurred in the Cuyuni valley of Venezuela and the authorities of Surinam, I understand, have been studying some suspicious cases which occurred in the upper Surinam valley.

48. *The anti-aedes (Yellow Fever control) service.*—This service is operated in co-operation with the Rockefeller Foundation which contributes $2,000 budget for office expenses, clerical assistance and emergency supplies during 1941 (raised to $3,000 for 1942) and the services of a staff member who acts as Chief Officer. The area under control has been extended up the Demerara river for a distance of about 11 miles above its mouth, and to Bartica at the junction of the Essequebo and Mazaruni rivers to His Majesty's Penal Settlement on the Mazaruni river. The population of the area under control is 108,055. Censuses of the areas on the Essequebo and Mazaruni have not been completed, but the population is estimated at 3,900. The total comprises nearly one-third of the population of the Colony. On December 31, 1941, this service had 98 inspectors, 2 supervisors, 2 supervising inspectors, 10 chief inspectors and 2 temporary chief inspectors, in addition to 9 fish distributors and oilers, and a clerical staff of five. Expenditures amounted to a total of $38,776.72 plus $1,299.10 from the Rockefeller Foundation's contribution. Stegomyia house indices vary from less than 1% to 5% in the various districts. The gutter squads are finding considerable breeding in roof gutters, and when these are all discovered it is likely that considerably lower indices will be speedily obtained. It has been easier to bring down the indices in the rural districts, than in Georgetown, which makes us hopeful that the same will be true for the rest of the Colony. The House index for Bartica and the Mazaruni Penal Settlement has reached less than 1% in a comparatively short time. In Georgetown the indices for "all species" and for aedes aegypti have been closely parallel, whereas in the outlying villages there has been a tendency for the former to increase slightly after periods of rain, which leads us to believe that in Georgetown, at least, culex mosquitoes will be eliminated along with aedes aegypti, which should have some effect on the incidence of filariasis. A maritime service inspects aircraft, boats, barges and other craft in the Demerara estuary. It has been found that incidence of aedes breeding is on the whole much smaller than was expected.

49. *Leprosy.*—The number of new admissions to the Leprosy Hospital was 27. There were 14 new out-patients, making a total of 41 new cases discovered during the year.

50. At the end of 1941 there were 10 girls and 24 boys in the Bishop Galton

Home and 11 girls and 15 boys in the Lady Denham Home, making a total of 60 children in both homes.

51. Treatment consists, as before, in the subcutaneous and intra-dermal injection of esters of Hydnocarpus oil, and the results continue to be satisfactory. In addition the external application of Trichloracetic acid in varying dilutions and solid carbon dioxide is practised in suitable cases. 124 operations were performed. There were 283 sessions in the electrotherapeutic department and 1,070 treatments were given.

52. *Filariasis.*—38 deaths were registered from this disease.

53. *Erysipelas.*—4 cases as compared with 1 for 1940.

54. *Opthalmia Neonatorum.*—45 cases as compared with 54 in the previous year.

55. *Measles.*—This disease, which was epidemic during 1939 and 1940, was removed from the list of notifiable diseases by resolution of the Central Board of Health on 24th July, 1940 the epidemic having subsided. There were 3 cases with no deaths treated as inpatients at Public Hospitals during the year.

56. *Venereal Diseases.*—The following table gives the number of venereal diseases treated as in-patients in Public Hospitals for the last two years :—

Year.	Syphilis.					Soft Chancre.	Gonorrhœa.	Granuloma Venereum.
	Primary.	Secondary.	Tertiary.	Hereditary.	Stage not Indicated.			
1940 ...	99	17	548	43	4	42	501	90
1941 ...	129	7	390	18	...	31	522	81

The number of Novarsenobillon and other injections given for syphilis at the Public Hospitals was 31,705 compared with 32,203 in 1940.

57. The following shows the number of cases of venereal diseases treated on Sugar Estates for the past two years :—

	1940.	1941.
Gonorrhoea	259	257
Chancroid	18	6
Syphilis	201	132
Granoluma Venereum	5	1

Venereal Diseases Clinic, Public Hospital, Georgetown.

58. *Syphilis.*—839 new cases were admitted for treatment as compared with 851 in 1940.

59. *Gonorrhœa.*—There were 1,031 new admissions as against 715 in 1940.

60. *Defaulting.*—There was the usual high incidence of defaulting.

61. *Attendance.*—4,223 patients attended for clinic during the year as against 4,189 in 1940.

62. Leaflets were distributed at the clinics and talks were given to individual new cases.

Table I.

DISEASES TREATED IN THE SEVEN GENERAL HOSPITALS DURING 1941.

No.	Corresponding number in International List (1929 Revision).	Disease.	In-Patients.		Out-Patients.
			Total Cases.	Total Deaths.	Total Cases.
1	1	(a) Typhoid fever ...	194	57	7
	2	(b) Paratyphoid fever ..	15	1	...
2	3	Typhus fever ...	...	...	...
3	4	Relapsing fever ...	1	...	...
4	5	Undulant fever ...	...	...	...
5	6	Smallpox ...	...	...	...
6	7	Measles ...	3	...	4
7	8	Scarlet fever ...	...	...	...
8	9	Whooping-cough ...	7	...	64
9	10	Diphtheria ...	34	6	...
10	11	Influenza—			
	11a	(a) with respiratory complications ...	8	...	105
	11b	(b) without ,, ,, ...	23	1	27
11	12	Cholera ...	...	...	...
12	13	Dysentery—			
	13a	(a) Amoebic ...	38	1	9
		(b) Bacillary ...	5	...	...
		(c) Unclassified ...	29	3	59
13	14	Plague—			
	14a	(a) Bubonic ...	...	...	...
	14b	(b) Pneumonic ...	...	...	...
	14c	(c) Septicæmic ...	...	...	...
14	16	Acute poliomyelitis ...	5	...	1
15	17	Encephalitis lethargica ...	...	...	...
16	18	Cerebrospinal fever ...	2	...	...
17	21	Rabies ...	1	...	...
18	22	Tetanus ...	23	9	...

Table I.—Contd.

No.	Corresponding number in International List (1929 Revision).	Disease.	In-Patients. Total Cases.	In-Patients. Total Deaths.	Out-Patients. Total Cases.
19	23	Tuberculosis of the Respiratory System ...	431	136	100
20	24-32	Other Tuberculous diseases ...	29	8	22
21	33	Leprosy ...	5	...	2
22	34-35	Venereal diseases—			
	34a, 34b	(a) Syphilis ...	619	31	416
	35	(b) Gonorrhœa ...	611	1	332
	35	(c) Other V.D. ...	160	7	243
23	37	Yellow fever ...	...	...	...
24	38	Malaria—			
		(a) Benign tertian ...	244	13	61
		(b) Subtertian ...	175	3	56
		(c) Quartan ...	4	1	4
		(d) Unclassified ...	933	60	4,238
25	44-46	Blackwater fever ...	1	1	...
26	39	Kala-azar ...	...	...	...
27	39	Trypanosomiasis ...	...	...	...
28	39	Yaws ...	14	...	20
29	39	Other protozoal diseases ...	1	...	...
30	40	Ankylostomiasis ...	310	2	85
31	42	Schistosomiasis ...	1	...	...
32	41, 42	Other helminthic disease ...	80	...	744
33	15, 19, 20, 36, 43, 44	Other infectious and/or parasitic diseases ...	401	19	706
34	45-55	Cancer or other tumours—			
	45-53	(a) Malignant ...	184	34	7
	54	(b) Non-malignant ...	219	1	43
	55	(c) Undetermined ...	19	1	23
35	56-57	Rheumatic conditions ...	199	...	639
36	59	Diabetes ...	83	14	50
37	60	Scurvy ...	1	1	...
38	61	Beriberi ...	...	...	4
39	62	Pellagra ...	...	...	...
40	58, 63, 64	Other diseases—			
		(a) Nutritional ...	249	30	1,406
		(b) Endocrine glands and general ...	77	...	433
41	70-74	Diseases of the blood and blood-forming organs ...	156	34	1,271
42	75-77	Acute and chronic poisoning ...	75	7	5
43	82	Cerebral hæmorrhage ...	32	21	...
44	78-91, 83-87	Other diseases of the nervous system ...	516	41	1,363
45	88	Trachoma ...	2	...	5
46	88	Other diseases of the eye and annexa ...	627	1	2,750
47	89	Diseases of the ear and mastoid sinus ...	143	6	525
48	90-103	Diseases of the circulatory system—			
	90-95	(a) Heart diseases ...	347	128	462
	96-103	(b) Other circulatory diseases ...	218	22	757
49	106	Bronchitis ...	637	47	5,775
50	107-109	Pneumonia—			
	107	(a) Broncho-Pneumonia ...	86	47	11
	108	(b) Lobar-Pneumonia ...	357	84	34
	109	(c) Otherwise defined ...	55	8	111
51	104, 105, 110-114	Other diseases of the respiratory system ...	618	32	2,804
52	119-120	Diarrhœa and enteritis—			
		(a) Under 2 years of age ...	43	13	175
		(b) Over ,, ,, ...	152	18	271
53	121	Appendicitis ...	134	6	48
54	122	Hernia, intestinal obstruction ...	451	22	121
55	124	Cirrhosis of the liver ...	23	8	10
56	125-127	Other diseases of the liver and biliary passages ...	196	16	175
57	115-118, 123, 128, 129	Other diseases of the digestive system ...	963	40	10,499
58	130-132	Nephritis (all forms)—			
	130	(a) Acute ...	59	20	182
	131	(b) Chronic ...	305	102	212
59	133-139	Other non-venereal diseases of the genito-urinary system	1,487	46	1,695
60	140-150	Diseases of pregnancy, childbirth and puerperal state			
	140-141	(a) Abortion ...	267	...	58
	142	(b) Ectopic gestation ...	20	3	...
	145-147	(c) Toxæmias of pregnancy ...	43	9	64
	148-150	(d) Other conditions of the puerperal state ...	64	57	134
61	151-156	Diseases of the skin, cellular tissue, bones and organs of locomotion.	2,697	51	4,078
62	157-161	Congenital malformations and diseases of early infancy			
	158	(a) Congenital debility (Children under 1 year) ...	102	63	...
	159	(b) Premature birth ...	50	42	...
	160	(c) Injury at birth ...	8	5	...
63	162	Senility ...	228	69	122
64	163-198	External causes—			
	163-171	(a) Suicide ...	...	...	...
	172-198	(b) Other forms of violence ...	1,710	28	4,692
65	199-200	Ill-defined causes ...	3,108	11	3,150
		Total ...	21,417	1,518	51,469

IX.—The Board of Examiners, Chemists and Druggists.

63. The Board of Examiners, Chemists and Druggists, held five meetings during the year. The qualifying Examination for First Professional and Final Students was held during November. Ten candidates presented themselves for the First Professional Examination and seven for the Final. Of these, 7 were successful at the First Professional Examination and 5 at the Final Examination.

APPENDIX I.

SUMMARY OF THE ANNUAL REPORT OF THE CENTRAL MEDICAL LABORATORY, GEORGETOWN, FOR THE YEAR ENDED 31ST DECEMBER, 1941.

Total number of routine examinations ...	... 27,741
Postmortem examinations ...	... 154
Vaccines and Allergens prepared ...	... 9,753 c.c.

This does not include patients seen and vaccines administered in the outpatient department of the Public Hospital, Georgetown, and in the Laboratory.

BLOOD.—		
Parasitological	...	... 1,297
Cultural	...	... 370
Haematological	...	... 562
Serological		
Widal	...	... 679
Kahn	...	... 9,179
Laughlen	...	... 7,901
Heterophile Reaction	...	... 1
Chemical	...	... 261
FAECES.—		
Microscopical	...	... 302
Cultural	...	... 603
Chemical	...	... 222
SPUTUM.—		
Microscopical	...	... 514
Cultural	...	57
URINE.—		
Microscopical	...	... 323
Chemical	...	... 612
Cultural	...	... 253
Microscopical and Chemical (Combined)	...	... 31
Kidney Function Tests	...	... 77
CEREBRO-SPINAL FLUID.—		
Kahn Test	...	... 41
Microscopical	...	... 57
Chemical	...	... 38
Cultural	...	... 11
URETHRAL, VAGINAL AND PROSTATIC SMEARS.—		
Microscopical	...	... 172
Cultural	...	... 61
THROAT SWABS.—		
Microscopical	...	... 249
Cultural	...	... 510
VARIOUS CULTURES	...	... 155
MISCELLANEOUS EXAMINATIONS.—		
Spleen Smears from rats	...	... 899
Histological	...	... 177
Conjunctival Smears	...	... 72
Other microscopic examinations	...	... 64
Fractional Test Meals	...	... 97
Bacteriological Examination of Water	...	... 53
Bacteriological Examination of Milk	...	... 6
Medico-legal	...	... 11
Allergic Skin Tests	...	... 88
Unclassified	...	... 1,884

Details can be seen in the full Report in typescript filed in the Laboratory.

P. A. CLEARKIN,
Government Bacteriologist.

APPENDIX II.

SUMMARY OF THE WORK OF THE YELLOW FEVER SERVICE FOR THE YEAR 1941.

The Anti-Aedes Aegypti Service, during 1941, extended its control area up the East Bank of the Demerara River to New Hope, a distance of about 11 miles from the mouth of the river. It also placed under control Bartica at the junction of the Essequebo, Mazaruni and Cuyuni Rivers and the Penal Settlement on the opposite bank of the Mazaruni. The entire area under control at the end of the year contained 19,057 houses (counting ranges as single houses). The population when our census was made was 94,254 persons but 1,316 houses were subsequently added so the number of persons in the control area at the end of the year is about 100,000.

Squads for inspecting high tanks and gutters and for seeking hidden mosquito breeding places were organized, but this work was frequently interrupted and the men used to replace zone inspectors who were absent because of illness or leave. These squads are now functioning more smoothly and should prove useful in further reducing the aedesindices. Special squads were also organized on a number of occasions to carry out producing-focus searches and particularly to train men in this technique.

The stegomyia house indices still range from 1 to 5 per cent. in the various districts, except in No. 8 and at Bartica, which are higher. District 8 includes the part of Georgetown which is most congested. Districts 9 and 10 are rural and include estates, small villages and isolated houses. The stegomyia indices have come down rather rapidly in these districts, and the technical problems appear to be less involved than in the city, except perhaps around the estate factories where large buildings do exist but the excellent co-operation of the estate managers has simplified the problem there. This gives us hope that, in all rural and estate parts of the country, the aedes control problem will be simpler than in Georgetown.

Curves obtained by plotting the indices for stegomyia breeding and " all species " breeding in Districts 1 (Kitty) and 10 (East Bank from Providence south) show a marked divergence. The indices for stegomyia breeding have come down at a more or less uniform rate and remain low, whereas those for " all species " fluctuate greatly with the amount of rain, the regularity of oiling latrines (in Kitty) and the condition of the canals and trenches. In other districts, culex and aedes indices have come down together and especially in Georgetown indicate that the elimination of aedes will be accompanied by a practice disappearance of culex quinquefasciatus (fatigans) although the latter is sometimes found in drains.

A maritime service, to inspect the boats, punts, barges, and other craft in the harbour, was put into operation October 6, 1941. An average of 221 boats per week has been examined of which only 3.9 per cent. were found to be breeding stegomyia and 6.9 per cent. breeding all species of mosquitoes. We had expected to find more. An interesting observation was the finding of anopheles (A. tarsimaculatus) in a sugar punt which had come down from one of the estates on the East Bank. Most (76%) of the stegomyia were found in barrels, tubs and drums, and most (80%) of the culex larvae were found in holds, and on cabin floors.

The Bartica service suffered several interruptions due to illness or enforced absence of the inspector. Now two inspectors are posted there and regular weekly cycles are being completed both in Bartica and at the Penal Settlement. The present inspectors have shown much enthusiasm and are striving for stegomyia eradication before it is achieved in Georgetown. Fish have been obtained in the vicinity but the supply is not constant and it has been found more practical and economical to send fish from Georgetown. Initial indices of 43 per cent. " all species " and 40 per cent. stegomyia were found, which were reduced by the end of the year to 9 per cent. " all species " and 7 per cent. stegomyia.

Late in the year, when there was assurance that funds would be available, another group of probationary inspectors was selected and training started. When these are trained we will be assured of ample replacements for inspectors who become sick and to properly man several special squads. For some months we had barely enough men to man the zones, without replacements for absentees, and for a while work was stopped in District 10.

Goodwill toward the campaign has been increased by the control of pest mosquitoes on the front lands by the city and government oilers and by those of Kitty Village. For a time, due to shortage of oil, many mosquitoes appeared in Kitty, but in general this work has been successful during the drought season. The Yellow Fever Service contributes to this by maintaining an inspector on the vacant lands to find breeding places.

Doctor Porter J. Crawford of the Rockefeller Foundation visited the colony in March and inspected the service.

Sir Rupert Briercliffe recommended to the Comptroller for Development and Welfare for the West Indies that the Service be extended ; and as mentioned elsewhere provision to that end was made.

An employee of the Demerara Bauxite Co. was trained in the techniques used by the campaign and in mosquito classification in order to prepare himself to carry out mosquito collections and control at Mackenzie City,

No cases of Yellow Fever or suspicious epidemics came to the attention of the authorities during the year.

APPENDIX III.

SUMMARY OF THE WORK OF THE MALARIA RESEARCH UNIT FOR THE YEAR 1941.

The outstanding feature of the year's observations was the return of anopheles darlingi in a restricted area about Lusignan in June. The disappearance of this species during 1940 has been a most interesting phenomenon.

The early work of the Service, in the nature of a general survey of the coast lands revealed some interesting information on the distribution and habits of anopheles darlingi and on the distribution of malaria. It revealed the encouraging fact that anopheles darlingi was not evenly distributed but that certain areas were heavily infested and others relatively free. This is termed encouraging because if they did breed in every pool or trench of water the problem would be hopeless. Information concerning the factors which make certain waters less attractive for anopheles than other waters is highly important in devising control measures.

In order to study certain problems more intensively, as suggested by Dr. Mark Boyd who visited the colony in March, it was decided to limit the observations to certain carefully selected areas and examine them more frequently. Collecting stations were established at Diamond and Farm, to ascertain if possible the reason for the relatively low incidence of malaria there ; at Lusignan and Buxton Village to study the effect of locating dwellings on the windswept foreshores as contrasted to dwellings protected by trees and bush ; at La Bonne Intention to ascertain the effect of changes in irrigation practice, especially the drying of the cross canals ; and at Tuschen and De Kinderen where contrasting conditions are found. By selecting a limited number of stations the cycle of visits is reduced so that visits at each station are sufficiently frequent to show any changes that may occur. In addition, certain estate inspectors send specimens weekly (adults and larvae) which are collected at predetermined stations. This gives a picture of the general anopheline population along the entire coast east of the Essequebo. It is proposed to obtain more specific information on the amount of malaria and its distribution by sampling children for parasites and enlarged spleens, attempting to follow certain specific groups of children over a period of time and also to obtain slides from fever cases which occur at certain plantations, which studies are now in progress.

Meteorology.

The lowest relative humidity recorded at the official station during the year was 58%, which occurred three times in March and once in November. The mean percentage humidity (three observations per day) was 81.3% in 1941 ; 78.8 in 1940 ; 79.8 in 1939, and 82.6 in 1938.

The absolute maximum temperature was 90.5°F on October 11th. The absolute minimum was 72°F which occurred 5 times (January, March and July). The extreme temperature range from 72.0° to 90.5° was 18.5°F.

The rainfall as recorded at the official station in the Botanical Gardens was 90.02 which is only 0.46 inches below the 60-year average rainfall. However, the ground was not thoroughly soaked up at the end of the year and the effects of the prolonged drought were still evident. 1938 was a fairly wet year until the end of August, after which there was less rainfall than the normal as measured by the 60-year average. The drought began about September 1, 1938 with a deficit of 5.72 inches for the last 4 months of that year. a deficit of 24.77 inches for 1939, of 21.63 for 1940. During the first 5 months of 1941 there was a deficit of 21.90 inches, but after the first of June each month except December showed an excess over the 60-year average for the corresponding month. If we take June, 1941 as the end of the drought it may be said to have lasted 33 months, although the effects of the drought were still evident at the end of the year. The amount of anopheline breeding has gradually increased since June, 1941, but the numbers of anopheles found have been too small for sound conclusions to be drawn from the various experiments.

SUMMARY OF LARVAE CAPTURED.

	Stations on Coast and Demerara.	Various other Estates.	Hyde Park Air Base.	Total.
A. darlingi	32	6	7	45
A. tarsimaculatus	5,128	1,890	261	7,279
A. albitarsis	225	11	...	236
A. triannulatus	707	82	313	1,102
A. apicimacula	...	...	287	287
Pupae (other than darlingi) ...	173	62	29	264
Not identified (small or damaged) ...	641	189	102	932
	6,906	2,240	999	10,145

SUMMARY OF ADULT ANOPHELINES CAPTURED.

Areas.	Darlingi.	Tarsim.	Albitar.	Triannulatus.	Total.
West of Demerara	1	138	7	...	146
East Bank of Demerara ...	...	108	1	3	112
Botanical Gardens to Ogle ...	...	12	...	...	12
L.B.I., Lusignan, Buxton	1,630	105	...	4	1,739
Enmore	...	1	...	...	1
Cane Grove...	1	366	...	...	367
Bath	...	...	...	...	...
Rose Hall	...	147	...	...	147
Albion	...	20	...	...	20
Port Mourant	...	25	2	...	27
Skeldon	...	120	32	...	152
Hyde Park Air Base	1	77	...	2	80
	1,633	1,119	42	9	2,803
Animal pens, stables	1	485	...	40	526
	1,634	1,604	42	49	3,329

Anopheles Darlingi.

Adult darlingi were captured before larvae were found and even to the end of the year it remained much easier to find adults (in certain areas) than larvae.

During 1940 the number of darlingi rapidly decreased, although they had not been numerous for a considerable time during the drought. The larvae disappeared first, followed a few weeks later by a decrease in the number of adults received from all sources.

Only 76 larvae were captured after the 13th week (end of March, 1940), of which 46 came from the East Bank of the Demerara, 15 from the East Coast of Demerara, 13 from east of the Berbice River, and 2 from Schoon Ord on the West Bank of the Demerara. Adult darlingi disappeared at about the same rate as the larvae but several weeks later. Rare survivors were found until the end of the year, but only 4 specimens were taken after the first week of October.

On January 20, 1941, two darlingi larvae were picked up at Goedverwagting (near Plantation Ogle). A few adults were found between mid-January and mid-February (4 at L.B.I. and one at Mon Repos).

In the middle of June (week 25) some weeks after the heavy rains started 153 adult darlingi were captured at Lusignan, followed by the finding of 196 more during the next six weeks, during which 1 was also found at L.B.I., 5 at Mon Repos, 1 at Buxton and 1 at Cane Grove. During the 31st and 32nd weeks (July 27th to August 9th) single specimens were received from the Hyde Park Air Base, from Leonora (the only specimen obtained from west of the Demerara River) and from the Providence cow pen (East Bank). After an apparent absence of some weeks, they again were found at Lusignan (early September) and continued to be found there until the end of the year. Smaller numbers were also found at L.B.I. (after October 5th) and at Mon Repos (after November 23rd).

The total number of adult darlingi captured was 1,634 :

Lusignan	1,373
La Bonne Intention... ...	76
Mon Repos	168
Buxton-Friendship	13
Cane Grove	1
Providence cow pen... ...	1
Leonora	1
Hyde Park Air Base ...	1
Adult darlingi	1,634

It is not far from Lusignan to Buxton and the latter place is a village with much foliage affording shelter to mosquitoes. We expected to find more adult darlingi there than we did, since considerable numbers were found at Lusignan.

Buxton, Friendship, Mon Repos and L.B.I. all lie in the same area about 8 to 12 miles east of Georgetown. With the exception of 4 specimens, all adult darlingi came from this area. A special detailed search was made for breeding places, with surprisingly meagre success, as only 45 darlingi larvae were found in the entire year, including 7 from the Hyde Park Air Base (25 miles up the Demerara River) and the two from Goedverwagting captured early in the year. The latter place is a few miles west of L.B.I. hence in the same general area.

Repeated searches were made, extending far back into the fields. The 36 larvae were picked up during 11 different "observations" (each "observation" corresponding to 100 yards of canal carefully sampled) and these were scattered over three large plantations (Lusignan, Mon Repos and L.B.I.) and 23 weeks of time. It is possible that eggs survived the drought and that some hatched when conditions became favourable. There were evidently scattered over a large area, so that the chance of finding them during systematic samplings was small. On the other hand, the adults which emerged over this large area tended to concentrate in the habitations where finding them was relatively easy. After the long period of fruitless searching, the inspectors became enthusiastic when comparatively large adult catches were again possible, and it made them determined to find the breeding places, but with less success.

At Mackenzie, and the mines, 65 to 70 miles up the Demerara River, darlingi larvae were

found in small numbers during each month exeept June. Twenty-five adults were captured in November.

Considering the fact that darlingi disappeared during the drought and is now slowly reappearing, it is especially interesting to investigate the conditions which are favourable for breeding. Darlingi larvae were found in waters having a pH of from 4.5 to 7.3 and a salt content of from .028 to .126 grams per litre as measured with silver nitrate reagents.

It is also of interest to consider the waters of areas where darlingi has not reappeared and to ascertain if there has been any marked shifting of the pH-salinity relationships over a period of time in those areas where larvae are again being found. In order to test this the observations made at a given time at a given plantation were grouped into 4 categories :

1. Those having pH above 5.5 and salinity under 100 p.p.m.
2. ,, ,, ,, below ,, ,, ,, ,, ,, ,,
3. ,, ,, ,, above ,, ,, ,, over ,, ,,
4. ,, ,, ,, below ,, ,, ,, ,, ,, ,,

These values are not considered as critical limits for darlingi breeding, but merely as convenient values. Certainly waters having a pH above 5.5 and a salt content of less than 100 parts per million are " favourable " for such breeding, in so far as it may be affected by these two factors. Group 4 would represent the number of observations that are both highly acid and highly salty. Comparing successive weeks, a shift towards groups 1 and 3 would indicate a diminution in acidity in the areas sampled and a shift towards 1 and 2 would indicate a diminution in salinity. Increases in group 1 indicate increases in the number of " favourable " waters sampled. Perhaps the simplest way to show the results of thsse findings is to express, as a percentage, the ratio of the number of " favourable " group 1 observations to the total number of observations taken at a given time and place. This does not, of course, show all the possibilities of this grouping, such as treating pH and salinity separately, but that may be more interesting at a later time when larvae are again abundant and conditions prevailing then can be compared with those existing during the absence of larvae.

	Week No.	Total Observations.	Favourable %.	No. larvae Darlingi.
La Bonne Intention	5—6	89	38%	...
	19	70	14	...
	24—25	62	27	...
	28—29	48	4	...
	32 + 35	80	22	...
	38	42	50	...
	41	43	30	...
	45	43	58	...
	48—49	44	73	15
Lusignan	6—7	143	43	...
	20	119	35	...
	25—26	34	41	...
	29—30	52	25	1
	32—33	71	34	1
	36	110	72	...
	39	97	62	...
	42	101	55	...
	45—46	140	77	3
	49—50	114	85	2
Mon Repos	50—51	29	59	8
Goedverwagting	4	46	48	2
	17—18	46	8.7	...

These are recorded merely because they do show a shift towards a greater number of " favourable " breeding places when darlingi larvae begin to appear. At Lusignan, week 32–33, one larva was found, and 34% of the waters sampled were " favourable." Actually only three were unfavourable because of salinity and many had pH values just under 5.5.

Anopheles Albitarsis.

A total of 42 adult A. albitarsis were captured during 1941. None were found during the searches of animal pens and stables. Of these 32 came from Skeldon on the Courantyne River, 2 from Port Mourant, 1 from Peter's Hall on the Demerara and 7 from west of the Demerara (Uitvlugt 1, Cornelia Ida 6).

236 larvae were found during the year—186 from west of the Demerara, 35 from the Botanical Gardens, Sophia, Lodge and Providence, 13 from Lusignan and Mon Repos and one each from Rose Hall and Port Mourant.

The greatest number were found in April—184, or 78%. January produced 24, December 14, and the other 14 were obtained in various months. The waters in which these were found varied in pH from 4.9 to 7.1, rather evenly distributed throughout this range. The salt content was uniformly low, all but 1 having been found in waters having a salinity of .064 gram per litre, or less, and that one was found in water having .084 gram per litre of salt. Over 81% of the larvae came from waters having a salinity of .042 p.p.m. or less.

Anopheles Triannulatus (Bachmanni).

49 adult A. triannulatus were captured, including 4 from the East Coast, 3 from the East Bank of the Demerara, 2 from the Hyde Park Air Base, and 40 from animal pens and stables.

A total of 1,102 larvae were recorded, of which 313 came from the Air Base. Of those from the coast lands (excluding the Air Base)—89% were captured before the end of April. Their sources were as follows:

East Bank of Demerara (Botanical Gardens to Farm)	719
West of the Demerara River (Versailles to Tuschen)	69
Rose Hall	1
Air Base	313
	1,102

The pH varied from 5.5 to 7.3. 46% of the larvae were found in water having a pH of 6.3 and 6.1. However, by dividing the number of larvae in each pH group by the number of observations one gets values representing the number of larvae per observation that are nearly the same for each group within the limits 5.5 to 7.3. This suggests that the larvae were equally content in any pH group within the limits, but that more of the waters sampled happened to have pH values of 6.1 and 6.3. This should be tried when larger numbers of larvae are available from given areas.

At Eccles (weeks 12–13) 59 "observations" were made, each representing 100 yd. of canal. 39 triannulatus larvae were found in 7 of these observations. 54 of the observations were in the pH range of 6.1 to 7.3 but only seven contained larvae and 47 did not. This suggests that factors other than acidity are of major importance in limiting the multiplication of this species. At Rome where 170 triannulatus larvae were found in the 13th week, only 18 out of 58 hundred-yard units of canal contained larvae and all of the barren areas sampled were within the pH range in which larvae occurred.

Adult Mosquito captures in animal pens.

A total of 526 adult mosquitoes was captured during the year in mule, cow and sheep pens, including Tarsimaculatus 485, Triannulatus 40, Darlingi 1—Total 526.

Anophelines at Mackenzie.

Mackenzie and the bauxite mines are located in the interior, 65–80 miles up the Demerara River. Through the courtesy of Dr. Jardine we have been receiving the reports of the malaria incidence and of the anophelines obtained by the inspector, Mr. Chee-a-Tow, who was trained by the Malaria Service.

The total number of larvæ found during 1941 was as follows:

Darlingi	227
Tarsimaculatus	108
Albitarsis	251
Triannulatus	679
Apicimacula	114
	1,379

Note: The larvæ mentioned above are not included in the summary of larvæ given earlier in this report, which includes only larvæ examined in our laboratory.

Malaria Incidence.

The programme of obtaining parasite and spleen rates at the estates selected for study was started after the director's return to the Colony. It will be discussed in a subsequent report. There has been no flare-up of malaria as yet but it is possible that one will occur when darlingi again becomes prevalent. Mr. Jack's summary of cases occurring at the estate hospitals connected with the Sugar Producers' Association, showed that during 1940 there were less than half as many hospital cases with diagnoses of malaria as in 1939. The same was true of dispensary cases and cases of blackwater fever. Statistics for 1941 have not yet been compiled but it is likely that they will show low malaria rates.

General.

Miss Daphne Fulton, technician attached to the unit, was sent to the malaria laboratory in Tallahassee, Florida, to perfect her knowledge of laboratory techniques. She left Georgetown on May 26 and returned on July 26. Miss Mary B. Thomas was appointed assistant technician on April 1. The director was away from the colony on leave from May 22 to October 30.

Summary of Expenditures.

1. Chief Field Technician	$ 755 00
2. Laboratory Assistants	835 00
3. Secretary	100 00
4. Field Inspectors	1,290 19
5. Travelling and subsistence	731 54
6. Laboratory equipment (Rent)	1,377 74
7. Training of personnel	589 58
8. Experimental and control work. Contingencies	311 47
	$ 5,990 52

Sources of Funds.—

Government of British Guiana	...	$ 1,996 85
Sugar Producers' Association	...	1,996 83
Rockefeller Foundation	...	1,996 84
		$ 5,990 52

GEORGE BEVIER.

(M.P. 71/4v).